NOS Science Seminars – Summary Report

INTRODUCTION

In October 1999, the NOS Science Council initiated a monthly seminar series focused on science. The original goals of the series included showcasing NOS science to improve understanding and communication within NOS and fostering the exchange of ideas across different NOAA elements. Due to broad NOS support, as well as support and participation from NMFS and other Line Offices, the series has expanded, hosting an average of two speakers a month. In addition to scientists based in Silver Spring, scientists from regional offices, laboratories and universities around the world have enthusiastically participated in the series providing greater breadth and perspective. The following list of speakers participated in the first six months of the series. Abstracts of their presentations are also attached.

LIST OF SPEAKERS

Craig Downs
National Centers for Coastal and Ocean Science/ Center for Coastal Environmental Health and Biomolecular Research
"Cell-Stress indicators – Diagnosing ecosystem health"
October 14, 1999

Silke Rick
Sponsored by National Centers for Coastal and Ocean Science (The Academy of Natural Sciences Estuarine Research Center)
"Eutrophication in the Elbe-German Bight and Mississippi-Louisiana Shelf systems: Susceptibility to negative effects is linked to nutrient ratios and hydrographic features"
October 27, 2000

Tom Brosnan
Office of Response and Restoration/Damage Assessment Center
“Comparison of Eutrophic Trends in Western Long Island Sound, Raritan Bay and Jamaica Bay, NY”
November 23, 1999

Julia Parrish
National Centers for Coastal and Ocean Science /Center for Sponsored Coastal Ocean Research/Coastal Ocean Program
“Seeing the Forest AND the trees: The Pacific Northwest Coastal Ecosystems Regional Study (PNCERS)”
December 2, 1999

Roger Zimmerman
National Marine Fisheries Service
“Research in Essential Fish Habitat restoration at NMFS Galveston”
January 11, 2000

Mark Fonseca
National Centers for Coastal and Ocean Science /Center for Coastal Fisheries and Habitat Research
"Deepwater seagrass and hard bottom habitats of the west Florida shelf: a first look at an overlooked essential fish habitat"
January 20, 2000

Mark Schenewerk
National Geodetic Survey
“BAYONET: Measuring crustal deformation to better understand sea level rise in the Chesapeake Bay”
January 26, 2000

David Townsend
Sponsored by National Centers for Coastal and Ocean Science /Center for Sponsored Coastal Ocean Research/Coastal Ocean Program (University of Maine)
“Red Tides: in the Gulf of Maine: Are they getting worse?”
February 23, 2000

Michael Hamnett
Sponsored by National Centers for Coastal and Ocean Science /Center for Sponsored Coastal Ocean Research/Coastal Ocean Program (University of Hawaii)
" The Hawaii Coral Reef Initiative Reef Research Program"
March 3, 2000

Clive Wilkinson
National Centers for Coastal Ocean Science/Center for Coastal Monitoring and Assessment (Australian Institute of Marine Science/Global Coral Reef Monitoring Network)
"The Global Coral Reef Monitoring Network: Implications for a national program"
March 7, 2000

Manuel Barange
Sponsored by National Centers for Coastal and Ocean Science /Center for Sponsored Coastal Ocean Research/Coastal Ocean Program (GLOBEC)
"The Global Ocean Ecosystems Dynamics Program"
March 16, 2000

Alyce Fritz
Office of Response and Restoration/Coastal Protection and Restoration Division
"Science Application: Watershed mapping and database projects for improved remediation and restoration decisions"
March 22, 2000

Suzanne Bricker
Special Projects Office
"National Estuarine eutrophication assessment: effects of nutrient enrichment in the Nation's estuaries"
March 23, 2000

Danielle Luttenberg
National Centers for Coastal and Ocean Science
"Harmful Algal Blooms in US Waters: Assessment and Management of a National Problem"
April 4, 2000

ABSTRACTS

Barange, M. “The Global Ocean Ecosystems Dynamics Program”

GLOBEC is an International Geosphere-Biosphere Program (IGBP) Core Project, with co-sponsorship by the Scientific Committee on Oceanic Research (SCOR) and the Intergovernmental Oceanographic Commission (IOC). The GLOBEC Goal is "To advance our understanding of the structure and functioning of the global ocean ecosystem, its major subsystems, and its response to physical forcing so that a capability can be developed to forecast the responses of the marine ecosystem to global change."

GLOBEC programs exist in many nations worldwide, with significant programs on the east and west coast of the U.S., as well as a program in the Southern Ocean. The U.S. program is jointly supported by NOAA's Coastal Ocean Program and the National Science Foundation's Ocean Sciences Division. Scientists from several NMFS and OAR labs have been involved in collaborative research with academic scientists in these programs, and GLOBEC provides a model of interagency cooperation in the U.S.

Bricker, S. “ National Estuarine eutrophication assessment: effects of nutrient enrichment in the Nation’s estuaries”

NOAA has compiled consistent and comparable information about water quality parameters associated with nutrient enrichment for 138 estuaries and the Mississippi River Plume. A method was developed to combine results for a subset of these parameters (Chl a, epiphytes, macroalgae, dissolved oxygen, SAV, HABs) into an indicator of overall eutrophic condition. This information was combined with other national databases to make an assessment of: overall eutrophic condition; factors influencing development of problems; and whether conditions will improve or worsen by the year 2020. Results of this assessment were used as the basis for the Harmful Algal Bloom and Hypoxia Research and Control Act of 1998, Hypoxia Assessment report to Congress.

Well-developed eutrophic problems are exhibited by 44 of 139 systems, an additional 40 have moderate level conditions. Problems occur in estuaries along all coasts but the Gulf of Mexico and Mid Atlantic regions have the greatest percent of estuaries with high level problems. Human related nutrient inputs are a significant influence on development of problems in the majority of estuaries with high level conditions. Overall eutrophic conditions have improved in 14 and worsened in 48 estuaries since 1970, and by the year 2020 conditions are expected to worsen in 87 and improve in only 8 estuaries. These results highlight the need for a strong national response to this pervasive problem.

Brosnan, T. " Comparison of Eutrophic Trends in Western Long Island Sound, Raritan Bay and Jamaica Bay, NY"

Significant improvements in water quality have been observed for several decades throughout much of the Hudson-Raritan Estuary, largely as a result of regional abatement of municipal and industrial discharges. These improvements include area wide, order-of-magnitude reductions in ambient coliform concentrations, and significant increases in dissolved oxygen (DO) concentrations. However, in contrast to these improvements, DO in bottom waters of the western Long Island Sound (WLIS) appears to have decreased in the last two decades. Although there is no consensus as to why hypoxia in WLIS may have recently become more severe, several related hypotheses have been suggested, including an increase in eutrophication, increased density stratification, and changes in wastewater loads. To determine if eutrophication has increased in WLIS, trends in several indicators of eutrophication were examined from a long term water quality dataset. Since the mid-1980s surface DO supersaturation has increased, bottom minimum DO has decreased, and vertical temperature and DO stratification have increased in WLIS. The data also suggest an increase in chlorophyll a concentrations, and decrease in Secchi transparency in recent years, but no trend in dissolved inorganic nitrogen (DIN) or phosphorus (DIP). Some of these trends are also apparent in other eutrophic areas of the Hudson-Raritan Estuary, namely Jamaica Bay and Raritan Bay. Additional factors that may be contributing to the observed decline in water quality include recent changes in wastewater loads, and possible increases in upstream and nonpoint source loads.

Downs. C. " Cell-Stress indicators – Diagnosing ecosystem health"

No abstract available.

Fonseca. M. "Deepwater seagrass and hard bottom habitats of the west Florida shelf: a first look at an overlooked essential fish habitat"

No abstract available.

Fritz, A. " Science Application: Watershed mapping and database projects for improved remediation and restoration decisions"

Linking restoration information and contaminant distributions across a watershed enhances the potential for success in watershed-level restoration planning and community-based restoration projects. The Office of Response & Restoration, Coastal Protection and Restoration (CPR) program has developed watershed projects for several coastal regions affected by contaminant releases from Superfund sites and other sources. All CPR watershed projects use standard components along with information tailored to the major objectives of each watershed.

These watershed projects strengthen the protection and restoration of coastal watersheds by combining a standard database structure, database-mapping application (Query Manager), and GIS. Contaminant concentrations in sediment and tissues of aquatic organisms, sediment toxicity data, natural resource occurrence, land use, and potential habitat restoration projects are overlaid on a watershed's features and can be displayed at flexible spatial scales. This approach simplifies data analysis and presentation, provides valuable tools for complex decision-making, and improves our understanding of dynamic aquatic ecosystems. Watershed projects provide coastal resource managers and communities with an integrated assessment tool that improves evaluation, problem-solving, and data sharing among Federal, state, local agencies and communities for a broad spectrum of coastal issues.

Watershed and database mapping projects:

- Bundles data on a watershed level effectively
- Diverse data to be filtered and evaluated easily- "Filter and Fly"
- Improves communication among user groups and information-sharing
- Provides a database foundation that can be easily expanded and adapted to specific project needs

Hamnett, M. " The Hawaii Coral Reef Initiative Reef Research Program"

NOAA's Coastal Ocean Program administers the Hawaii Coral Reef Initiative (HCRI) of the University of Hawaii. The University of Hawaii at Manoa established the HCRI in June 1998 as a research and monitoring effort to better manage coral reef ecosystems in the State of Hawaii. Ongoing research efforts are addressing major threats to coral reefs including: overfishing, sedimentation, eutrophication, algae blooms, and introduced species. The HCRI has supported a number of monitoring, assessment, and research activities during its first two years of operation. HCRI research results will greatly improve the management and health of Hawaii's coral reefs and will provide knowledge that can be applied elsewhere in the Pacific and extrapolated to other regions.

Luttenberg, D. "Harmful Algal Blooms in US Waters: Assessment and Management of a National Problem"

Many coastal communities have experienced the environmental, human health, and economic impacts that harmful algal blooms (HABs) inflict. HAB events regularly threaten living marine resources, restrict local harvests of fish and shellfish, divert public funds to monitoring programs, burden medical facilities, and depress local recreational and service industries. Blooms of familiar and previously unknown species have occurred in new coastal areas with increasing frequency, and HABs are now found throughout US coastal waters, from the Gulf of Maine through the Gulf of Mexico, and north to Alaska.

The National Assessment of Harmful Algal Blooms presents a synthesis of current research on the causes, consequences, and status of HABs nationwide. This assessment was a multiagency, multidisciplinary effort conducted in cooperation with states, Indian tribes, local governments, industry, academic researchers, nongovernmental organizations, and other stakeholders. It summarizes the most up-to-date information available on the growing national problem of HABs. NOS has used this and other consensus reports to develop a National Algal Bloom Program that integrates research, monitoring, and response to HAB events. This includes the multiagency Ecology and Oceanography of Harmful Algal Bloom (ECOHAB), which funds research to develop the means to forecast bloom development, persistence, and toxicity, the Intensive HAB Monitoring Program, which focuses on the environmental conditions conducive to occurrences of HABs, and the Response Program for Biological Events, which assists Federal agencies and States in their response to fish kills, marine mammal mortalities, and other HAB-related events.

Parrish, J. " Seeing the Forest AND the trees: The Pacific Northwest Coastal Ecosystems Regional Study (PNCERS)"

PNCERS is a multidisciplinary, multi-investigator research program aimed at deciphering the important physical forces and human-mediated factors affecting coastal system structure and function in the estuaries and nearshore habitats of Oregon and Washington, with the ultimate goal of creating better tools for sustainable ecosystem management. At the start of its third year, PNCERS research has coalesced around two space-time scales: a broad scale concentration on physical forcing and its translation through the biological system in the nearshore; and a finer scale examination of human-mediated change in regional estuaries. Both themes include physical, biological, and social science. This talk will touch upon some of the evolving research projects, the collaborative efforts within and without PNCERS, and our goals and objectives for the coming years.

Rick, S. "Eutrophication in the Elbe-German Bight and Mississippi-Louisiana Shelf systems: Susceptibility to negative effects is linked to nutrient ratios and hydrographic features"

Nutrient and contaminant inputs to estuaries and coastal seas are globally ubiquitous problems that have caused and are continuing to cause fundamental changes in the structure and function of coastal ecosystems. Effective sewage treatment reduced the phosphorous input to German coastal regions over the last years, while no such clear decline was observed for the nitrogen input. The aim of the interdisciplinary project KUSTOS (Coastal fluxes of matter and energy: the transition land-ocean in the southeastern North Sea, 1994-1997) was to analyze and quantify fluxes of matter and energy from the land to the ocean throughout the coastal region of the German Bight. In spring of 1995 the project focused on the study of the effects of rising inorganic N:P ratios on the carbon cycling in the Elbe river plume. The Redfield ratio of N:P 16 for optimum phytoplankton growth is oftentimes applied in a simplifying approach to define which nutrient is limiting algal biomass production. For coastal management it is important to know if it is sufficient to keep a system P limited or to what extent an additional reduction of nitrogen input is needed to prevent negative effects of eutrophication.

Taken together the results of investigations in spring 1995 shoe that carbon fluxes in coastal, non-steady state system can be strongly underestimated when calculated based on nutrient consumption and the Redfield ratio. Likewise our results suggest that the availability of dissolved inorganic nitrogen above "Redfield" may still elevate particulate nitrogen pools, which can be exported to sediments and/or exported with currents to other regions far from the original source of input, as in the non consumed DIN. Additionally mesocosm experiments indicate an increasing biological oxygen demand with rising N:P treatment. A comparison of the Elbe-German Bight system with the Mississippi-Louisiana shelf system reveals the importance of hydrographical features in addition to ambient nutrient ratios for the susceptibility of a coastal system to negative effects of eutrophication.

Schenewerk, M. "BAYONET: Measuring crustal deformation to better understand sea level rise in the Chesapeake Bay"

Tide gauges in the Chesapeake Bay indicate that sea level is rising at twice the global average of 1.8 mm/yr. It has been suggested that the land surrounding the Chesapeake Bay may be subsiding; either locally, because of groundwater pumping for example, or regionally from post-glacial rebound. Subsidence would be impossible to separate from global sea level rise using tide gauges alone which measure the relative change of sea level with respect to the nearby land. In this project, we employ the Global Positioning System (GPS) to monitor vertical land motions near tide gauges around the
Chesapeake Bay and along the Atlantic coast in an effort to identify crustal deformation as a source of relative sea level rise.

Townsend, D. "Red Tides: in the Gulf of Maine: Are they getting worse?"

Red Tides, now more commonly known as HABs (Harmful Algal Blooms), are receiving more scientific attention in recent years as a direct result of the National ECOHAB Program. One of the coastal U.S. regions prone to "red tides" is in the northern Gulf of Maine. The toxic dinoflagellate Alexandrium sp. is seasonally responsible for local outbreaks of PSP (Paralytic Shellfish Poisoning), leading to seasonal closures of shellfish harvesting areas from Massachusetts to Nova Scotia . With NOAA and NSF ECOHAB funding, we began investigating the occurrences and possible causes of Alexandrium blooms in 1997. We have completed one complete season of field studies (1998), the results of which are leading us to question a number of assumptions previously held as to why PSP outbreaks occur when and where they do.

This talk will review the history of PSP/red tides in the Gulf of Maine region, relying upon a number of earlier research results and observations, and will critically examine some of the more commonly proposed explanations for PSP/red tide events. Those explanations include effects of coastal eutrophication, freshwater runoff events, and the possible role that a hurricane played in 1972, which, some have argued, set it all into motion (implying that red tides were extremely rare, or absent, prior to that date).

Results of our field work in summer, 1998, will be presented. We conducted three surveys that year of the coastal and offshore waters of the northern Gulf of Maine between New Hampshire and the outer Bay of Fundy, collecting data from more than 200 stations during each cruise in June, July and August. Hydrographic data (CTD casts) and water samples were collected for analyses of phytoplankton chlorophyll, inorganic nutrients and Alexandrium cell densities. Based on the results, we believe that the naturally-occurring offshore distributions of relatively high surface water densities of Alexandrium are be related to dynamics controlling inorganic nutrient fluxes and the ambient light field as it varies seasonally and vertically. Thus, periodic outbreaks of PSP in nearshore waters can be explained in most cases by wind-driven advection of offshore cells to those shellfish beds. These ideas form the basis for experiments targeted for our upcoming 2000 field season.

Wilkinson, C. "The Global Coral Reef Monitoring Network: Implications for a national program"

The Global Coral Reef Monitoring Network was established in 1995 as an international effort to gather information on the status and trends in coral reef around the world, and to promote actions which reduce the impact of human activities. Dr. Wilkinson, Director of the GCRMN, will examine the organization's role in protecting the fascinating world of coral reefs, and highlight implications for the nascent U.S. Coral Reef Monitoring Program.

Zimmerman, R. “Research in Essential Fish Habitat restoration at NMFS Galveston”

No abstract available.